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EXAMINER	
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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/080,944
Filing Date: February 22, 2002
Appellant(s): BUCKMAN ET AL.

Robert W. Nelson
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/12/07 appealing from the Office action mailed 11/16/06.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 5857042 A	Robertson; Brian et al.	01-1999
US 6486984 B1	Baney; Douglas M. et al.	11-2002
US 6695493 B2	Ciemiewcz; Jon T.	02-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 8-9, 14-16, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Robertson (U.S. Patent No. 5,857,042).

Regarding claims 1, 14, and 21 Robertson teaches a two-dimensional free space optical link (Figure 11) comprising: an array of tightly-coupled, multi-wavelength arrays of vertical cavity surface emitting lasers (VCSELS) (reference numeral 32_1-32_9 in Figure 11), operating at predetermined wavelengths; collimating optics (reference numeral 29A-29I in Figure 9) for collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal (as seen in Figure 3); and an array of tightly-coupled optical receiver arrays (e.g. the corresponding receiver array for Figure 11 and shown in Figure 3 and 9), each said receiver array being configured to receive the signals from one of said VCSEL arrays, wherein the wavelengths of the received signals generally match the wavelengths of the signals transmitted by said VCSEL arrays such that multiple optical wavelengths can be simultaneously

communicated at high-speed from one of said VCSEL arrays to one of said receiver arrays across a very short haul channel.

Regarding claim 2, Robertson teaches that said VCSELS are selected from the group consisting of bottom-emitting VCSELS and top-emitting VCSELS (Figure 8).

Regarding claim 3, Robertson teaches that said VCSEL array is configured as a tightly-bound cluster of VCSELS (as seen in Figure 11).

Regarding claim 4, Robertson teaches the emitting elements of each VCSEL in said cluster form a small group positioned at the focal point of said collimating optics (as seen in Figure 3).

Regarding claims 8 and 15, Robertson teaches that said short haul channel is free space (as seen in Figures 3-7).

Regarding claims 9 and 16, Robertson teaches that said short haul channel is optical fibers (as seen in Figure 8).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson in view of Baney (U.S. Patent No. 6,486,984).

Regarding claim 5, Robertson differs from the claimed invention in that Robertson fails to specifically teach that said tightly-coupled optical receiver array of the said receiver arrays

comprise partitioned optical filters and mating photodetectors. However, Baney in the same field of optical communication, teaches tightly-coupled optical receiver arrays wherein said receiver arrays comprise partitioned optical filters and mating photodetectors (reference numerals 82, 84, 86 in Figure 4). One skilled in the art would have been motivated to employ partitioned optical filters and mating photodetectors as taught by Baney in the device of Robertson in order to filter out interfering optical energy (column 7 lines 6-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to form the tightly-coupled optical receiver array of the said receiver arrays of Robertson so that they include partitioned optical filters and mating photodetectors as taught by Baney.

Regarding claims 6, the combination of Robertson and Baney teaches that said optical filters of each said optical receiver array further comprise multiple segments, each segment having an individual filter element designed to pass a transmitted optical signal with a specific wavelength range (Figure 4 of Baney).

Regarding claim 7, the combination of Robertson and Baney teaches that said photodetectors of each said optical receiver array further comprise multiple segments (Figure 9, 10B of Robertson; Figure 4 of Baney), each segment having an individual photodetector element that converts the transmitted optical signal received from each said filter element to an electrical signal.

5. Claims 10-12, 13, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Robertson in view of Baney and Ciemiewcz (U.S. Patent No. 6,695,493).

Regarding claim 10, 17, Robertson teaches a method of creating a two-dimensional optical link, the method comprising: assembling a vertical cavity surface emitting laser (VCSEL)

emitter array (Figure 11), wherein the VCSEL emitters in the array are arranged in a regular pattern; fabricating a receiver array (reference numeral 31A-31I in Figure 9), wherein the receiver array comprises a plurality photodetector arrangements (reference numeral 31A-31I in Figure 10B); and mounting the VCSEL emitter array and receiver array onto respective transmitter and receiver electronic circuits configured to receive the respective emitter and receiver arrays (Figure 9-11). Robertson differs from the claimed invention in that Robertson fails to specifically teach that each VCSEL emitter is set for a different emissive wavelength and that the receiver array includes a plurality of optical filters mating with the plurality of photodetector. However, Baney in the same field of optical communication, teaches tightly-coupled optical receiver arrays wherein said receiver arrays comprise partitioned optical filters and mating photodetectors (reference numerals 82, 84, 86 in Figure 4). One skilled in the art would have been motivated to employ partitioned optical filters and mating photodetectors as taught by Baney in the device of Robertson in order to filter out interfering optical energy (column 7 lines 6-23). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to form the tightly-coupled optical receiver array of the said receiver arrays of Robertson so that they include partitioned optical filters and mating photodetectors as taught by Baney.

Furthermore, Ciemiewcz in the same field of optical communication teaches that each VCSEL emitter is set for a different emissive wavelength (column 4 lines 28-41). One skilled in the art would have been motivated to emit different wavelengths from each of the emitters in order to accomplish wavelength division multiplexed transmissions (column 1 lines 58-65 of

Ciemiewcz). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to allow each VCSEL emitter to transmit a different emissive wavelength.

Claim 18, recites a combination of claims 6 and 7 that were rejected above. As such, claim 18 is rejected for the same reasons as stated in the rejection of claims 6 and 7.

Regarding claim 12 and 19, Robertson teaches that said short haul channel is free space (as seen in Figures 3-7).

Regarding claim 13 and 20, Robertson teaches that said short haul channel is optical fibers (as seen in Figure 8).

(10) Response to Argument

The main point of contention between the examiner and the Appellant is the limitation recited in claim 1 which reads: "collimating optics for collimating the optical signals emitted from each said multi-wavelength array of VCSELs into a single uniform optical signal." The Appellant contends that Robertson fails to teach this limitation while the examiner maintains that this limitation is clearly met by Robertson.

Appellant substantiates the argument at hand by analyzing Robertson's Figure 3 and first noting that a plurality of individual emitters are associated with individual collimating optics so that each emitter transmits a single collimated light path, then concluding that because of this no situation in Robertson exists wherein multiple emitters transmit via the same collimated optical signal. In response, the examiner agrees in general that individual collimating optics collimate light from each emitter to form a single and individual collimated light path for each emitter. However, the examiner disagrees with Appellant's conclusion because it fails on many levels each of which are illuminated below.

First, while the Appellant contends that multiple emitters transmit via the same ***collimated*** optical signal, no claim language exists to support this contention. Rather, the claim language simply requires that the collimating optics collimate optical signals emitted from a multi-wavelength array of VCSELs into a *single uniform optical signal*. There is no requirement in the claim language that this single uniform optical signal need be collimated. In other words, once the optical signals emitted from the multi-wavelength array of VCSELs have been collimated by the collimating optics, the only requirement is that they then be formed into a single signal that is uniform, or alternatively defined – not able to be differentiated. In the examiner's interpretation of the claim language, the collimating requirement is separate and distinct from the requirement to form a single optical signal. Therefore, the claim language leaves available the possibility that once the optical signals emitted from the multi-wavelength array of VCSELs have been collimated by the collimating optics they can then be overlapped to form a single uniform or undifferentiated optical signal.

Robertson clearly falls within the bounds of this possibility by first collimating light output from the multi-wavelength array of VCSELs (reference numeral 16 in Figure 3), then allowing, albeit inadvertently, the collimated signals to overlap at least partially so that overlapping portions form a single uniform or undifferentiated optical signal at the optical receiver (Figures 3 and 4). Of course, one may argue that even in this scenario the signals are not a single uniform signal. However, the examiner believes that once the optical signals overlap as they do when portions of collimated signals A and B overlap and portions of collimated signals C and D overlap, the overlapping portions of signals A and B can no longer be differentiated from one another and at that point the overlapping portions for a single uniform

ray of light containing undifferentiated or uniform portions of both signal A and signal B. Regardless, the examiner's interpretation of the terms "single uniform optical signal" are wholly consistent with Appellant's meaning of the same terms in that Appellant in the Brief clarifies that each single uniform optical signal includes signals emitted by a plurality of VCSELs (Brief page 7 lines 7-8). As noted above, Robertson's apparatus creates a single uniform optical signal that includes signals emitted by emitter 16A and emitter 16B.

Second, the claim language fails to place a limit on the number of optical signals actually emitted from the multi-wavelength array of VCSELs, and instead simply requires that whatever the number of optical signals emitted from each of the multi-wavelength array of VCSELs that these optical signals then be collimated into a single uniform optical signal. In direct contrast with Appellant's assertion that multiple emitters transmit via the same collimated optical signal, the claim language leaves open the possibility that only a single emitter in each of the multi-wavelength array of VCSELs may be emitting at any particular time. Carrying this scenario over to Robertson, it is clear that if only a single one of the emitters (reference numeral 16A-16D in Figure 3) of Robertson's multi-wavelength array of VCSELs is used at a particular time, then the light emitted from that emitter will certainly be collimated by the collimating optics into a single uniform optical signal since it is the only signal that is being emitted.

In fact, even if a pair of emitters in the multi-wavelength array of VCSELs of Robertson where emitting at any one time, the light from each emitter would first be collimated, then allowed to overlap to form a single uniform optical signal as they do when collimated signals A and B overlap in Figures 3 and 4 of Robertson. This scenario directly contradicts Appellant's unclaimed contention that no situation exists where multiple emitters transmit via the same

optical signal. Granted, they are not the *same collimated* optical signal, but as explained above, the claims do not require transmission via the same collimated optical signal.

Third, the claim language is written in such a manner that it calls into question its limiting effect. By reciting that the collimating optics are "***for** collimating the optical signals from each of said multi-wavelength array of VCSELs into a single uniform optical signal*," the Appellant appears to be suggesting how the collimating optics are intended to be used. As such, the question at hand is whether or not the collimating optics of Robertson can be used for the same purpose or in the same manner as that of the claimed invention. In the examiner's opinion, the answer is that they certainly can be used in the same manner and for the same purpose as claims by Appellant. To explain, Appellant's claim language does not provide any physical or structural characteristic that distinguishes the claimed collimating optics from Robertson's collimating optics. Furthermore, Robertson's collimating optics are clearly capable of collimating optical signals so that they overlap at some point forming a single uniform optical signal. Therefore, Robertson's collimating optics meet the claimed collimating optics in that they are not physically different from the claimed collimating optics and they are capable of performing the intended use.

Finally, Appellant notes that Figure 11 is cited in the office action and maintains that this figure fails to teach the limitation in question. However, the rejection was predicated on what was shown in Robertson's Figure 3, Figure 9, and Figure 11 taken as a whole. To explain, Figure 11 shows a 3x3 array which further includes clusters of 4x4 arrays of emitters or receivers 33. Figure 9 shows how such an "array of arrays" of Figure 11 can be coupled with two lenslet array units (29A-29I, 30A-30I) and a receiver "array of arrays." Figure 3 provides an up-close

drawing for how the light beams are produced by a single array (i.e. 32_1 in Figure 11) in the 3x3 cluster of arrays in Figure 11. All of these figures when taken as a whole anticipate the claimed invention.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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